RWQCB
REGION 1
MAR - 6 2006

☐ CK ______ ☐ RSG ______ ☐ EJL ______
☐ LGR ______ ☐ RRK ______ ☐ ______
☐ RLT ______ ☐ PCG ______ ☐ ______

SLR

March 3, 2006

Ms. Julie Raming
Georgia-Pacific Corporation
133 Peachtree Street, NE
Atlanta, GA 30303

Subject: Comments on January 2006 Draft Human Health and Ecological Risk Assessment Workplan for the Georgia-Pacific California Wood Products Manufacturing Facility, Fort Bragg, California

Dear Ms. Raming:

On behalf of the Fort Bragg Redevelopment Agency, we conducted a detailed review of the above-referenced report, and offer the following comments and suggestions for revising the document for final submittal to the California Regional Water Quality Control Board, North Coast Region (RWQCB). Overall, we found the Workplan to be well-written and generally consistent with California guidance. However, we have issues with several key portions of the risk assessment as currently proposed. Some of these comments, such as target cancer risks for human receptors and the approach and details of quantifying ecological exposures, are key to the process and need to be modified and/or more thoroughly documented before we can agree with how the risk assessment will be conducted.

Specifically, the process used for identification of chemicals of potential concern (COPCs) that will be quantitatively evaluated in the assessment needs to be modified, and the ecological risk assessment portion of the Workplan needs to be more transparent so that it is clear how the risk assessment will be implemented. We feel that it is preferable to identify all chemicals detected as COPCs, and to demonstrate through quantitative evaluation that many of them may be below levels of concern to human and/or ecological health at this site. This would eliminate a large portion of our comments, since we have many comments associated with the generation and use of risk-based screening Concentrations (RBSCs) presented in this Workplan.

Our comments also include issues associated with certain human health based exposure scenarios excluded from quantitative evaluation, assumptions regarding potential future land uses, identification of ecological receptors and methods planned for quantitative evaluation. The ecological risk assessment portion of the Workplan seems to be quite generic, and fails to identify any indicator species other than the deer mouse. It is difficult to adequately evaluate this portion of the Workplan since there is no discussion of how, or if, other ecological receptors will be quantitatively evaluated, including the mule deer, upper trophic level species such as the coyote, avian receptors, or plants. The development of site-specific RBSCs for just the deer mouse is problematic, as other species may have lower screening concentrations. For example, Oak

Ridge National Laboratory (ORNL) has developed screening concentrations for a variety of species, including many of those listed by TT as being applicable to this site. It would be more appropriate, easier to explain and defend, and be protective to use these ecological screening levels directly from ORNL if available rather than develop RBSCs that appear to be incomplete with regard to the conceptual site model for the site. The ecological risk assessment portion of the Workplan seems more appropriately described as a preliminary problem formulation step, yet appears to be presented as a comprehensive approach to ecological receptors.

Our specific comments are presented below, divided into three sections that are relevant to the entire process, human health risk assessment, and ecological risk assessment.

General Comments Relevant to Risk Assessment Process

1. **Soil Background Determination for Metals.** Although the overall approach to identify background concentrations of metals seems reasonable, some of the details are not appropriate. For example, Tetra Tech (TT) proposes to use three lines of evidence in establishing background concentrations, including analysis of onsite data, compilation of site-specific background data, and "regional" data. We question the need for and validity of using "regional" data since both onsite data and site-specific background data will be available for the site. The regional data they propose to use is a document by Bradford et al., which focused on soils in the central and southern portions of California. No samples were collected from either Mendocino or Sonoma Counties, which implies that the dataset is likely not relevant for use in establishing background concentrations for the mill site. Further, TT proposes to use the 75th percentile and maximum concentrations from this report to "define potential upperbound of background concentrations". This is not a conservative approach, because background concentrations will be used to eliminate metals from quantitative assessment in the risk assessment. Instead, mean and 75th percentile values should be used, not maximum concentrations. Our suggestion is to eliminate this third line of reasoning altogether, and limit development of background concentrations to onsite and locally-collected unimpacted samples. Figure B-2 is not consistent with the approach outlined in the main text. This figure indicates that onsite background data will not be considered at all in establishing background. According to the figure, an individual metal must exceed the maximum background concentration from Bradford before a RBSC is developed, and will then only be further evaluated if the RBSC is also exceeded. This figure should be modified to be consistent with the approach presented in the main text. If TT insists that the Bradford source be used, it should be limited to a comparison table of site-specific and statewide background levels.

2. **Soil Background Determination for Dioxins.** TT proposes to use ambient concentrations of dioxins and furans from an Exponent report as "background". All site data below this level would be excluded from quantitative analysis. We strongly disagree with this approach, since these "background" concentrations will likely be associated with a substantial degree of risk.

Further, we feel that the Exponent report is flawed with regard to its derivation of "ambient" levels for the mill site (see below). Instead, all dioxin and furan data should be quantitatively evaluated in the risk assessment. In the risk assessment, the degree of risk TT ascribes to "background" can be subtracted from the total. In this way, the public and agencies will know the total risk from chemicals at the site, and the relative contribution of dioxins and furans to this total. This allows for better risk management decisions to be made, and ensures that these important and highly toxic chemicals will be adequately addressed. Also, these chemicals are highly persistent and bioaccumulative, and are extremely toxic to many rodent species. Eliminating data based on ambient levels may also impact the ecological risk assessment, and provide a distorted view of the risks to the ecological community.

a. **Flaws of Exponent report.** Dioxins and furans are evaluated in a risk assessment using toxicity equivalency quotients (TEQs). A TEQ is a concentration of an individual component that equals the toxicity of the most toxic congener, 2,3,7,8-TCDD. Since all other components are less toxic than 2,3,7,8-TCDD, concentrations of the other components are multiplied by a fraction based on their relative toxicity. In this way, a single concentration of all dioxin and furans constituents can be used to assess exposure and potential risk. Exponent states that these compounds are unlikely to be present at the site as a result of historical use, even though fly ash stockpile samples from 1990 showed they were present at 3-4 nanograms per kilogram (ng/kg) TEQ (assuming non-detected congeners have a detection limit of zero). Using the typical risk assessment approach of ½ the detection limit for non-detected congeners, this TEQ concentration increases to 10-16 ng/kg. The mean rural background concentration reported in the USEPA dioxin reassessment document is 2.8 ng/kg. By contrast, the USEPA Region 9 residential soil Preliminary Remediation Goal (PRG) for dioxins is 3.9 ng/kg.

   Fish and sediment samples were very low in TEQ concentrations, but it is unclear whether fish were collected from an upland surface water feature or from the marine environment. Sediment was described as "fly ash mixed with offsite soils", so these samples were deliberately diluted with unimpacted soils. Exponent claims that one of the potential background sources is from wood-burning fireplaces. However, in Fort Bragg the wind almost always comes from the west, and all fireplaces are well east of the site. However, wood combustion was certainly conducted on the mill site, which would be an onsite source of the dioxins. The burning of agricultural fields and forest fires are also listed as background sources – again, this would not be likely to result in detectable concentrations of deposited ash and soot in an upwind direction. Exponent claims that the "the fly ash and sediment data collected in 1990 suggest that concentrations in fly ash are consistent with concentrations in rural background settings". Neither the detected levels nor discussion of background sources makes this a likely scenario at the mill site.

3. **Soil Physical Data (Table B-2.2).** Since exposures are assumed to be primarily limited to the top 5 feet of the soil column, the three samples collected at deeper depths should be excluded from determining site averages for physical properties.

Human Health Risk Assessment Comments

Comments on the human health risk assessment portion of the Workplan are subdivided into the following general categories:

- Screening and RBSCs
- Data Evaluation and COPC selection
- Exposure Scenarios, Receptors, and Point Concentrations

Screening and RBSCs

1. **Target Risk for Screening (Appendix B).** A human health lifetime excess cancer target risk of $1x10^{-5}$ (one-in-one hundred thousand) is proposed for developing preliminary risk-based screening criteria (RBSCs), rather than the more standard $1x10^{-6}$ (one-in-one million) typically used by the RWQCB and DTSC, particularly at the screening stage. This has important ramifications on the risk assessment in that chemicals with risks less than $1x10^{-5}$ would be excluded from quantitative assessment. Many chemicals have been detected at this site. Using a less stringent target risk level than the unrestricted land use standard also means that cumulative risks across all chemicals will not be adequately addressed. For example, if ten carcinogenic chemicals are present at the site, and each one is present at a concentration associated with a "screening level" risk of 1×10^{-5}, the overall cancer risk would equal 1×10^{-4}, which is 100-fold above the one-in-one million cancer risk. However, none of these chemicals would even be quantitatively evaluated because they did not exceed the 1×10^{-5} screening level. We have not seen this target risk level approved at a CalEPA-led site for screening purposes. Further, it is not appropriate to list this only in page B-7 of an appendix – this is the overriding target for human health risks, and should be clearly presented up front in the main portion of the document since it has ramifications across the entire process.

2. **RBSC Application (Appendix B).** It is unclear what is meant by the statement that "RBSCs may be reduced by a factor of 3 to account for the limited dataset" in situations where only one or two carcinogens are evaluated. Reducing an RBSC means making it more conservative; we think this statement was meant to say that less stringent RBSCs may be needed if only two carcinogens are evaluated, which would imply they would be increased by a factor of 3.

3. **Air RBSC Tables (Tables B-2.4, B-2.5).** What is the purpose of these tables? It appears as though a screening assessment was already conducted on the vapor intrusion pathway, and site-

specific screening levels developed. However, no details were provided to make this clear, or how the values will be applied in the risk assessment. If predicted indoor air concentrations shown in the tables are below the air RBSCs, will the chemicals be excluded from vapor intrusion modeling? If so, this is not appropriate since all data have not been collected or compiled. If not, clarification of the application of this table is needed.

4. **Soil-Based RBSCs for Human Health (Table B-3.6).** All of the RBSCs appear to exclude the dust inhalation pathway. This is inappropriate, particularly for metals where the only carcinogenic pathway is from dust inhalation (e.g., cadmium, cobalt, nickel, and beryllium). Exclusion of this pathway leads to much higher RBSCs for these metals, which is not adequately protective, particularly for screening purposes.

5. **Oral Slope Factors (Table B-3.1).** References are missing from this table, so the source of slope factors used to develop RBSCs cannot be adequately reviewed.

Exposure Scenarios, Receptors, and Point Concentrations

6. **CSM for Human Receptors (Figure 5).** Ingestion and dermal contact with pond water/sediments by a future construction worker should be complete pathways.

7. **Exposure Scenarios.** It is proposed that only Ponds 6 and 8 would be available for exposure in the future. Given the uncertainty surrounding future development plans, this seems to be an unsupported assumption. All ponds should be considered for potential future exposures. Additionally, it is assumed that only recreational receptors could be exposed to pond waters or sediments in the future. This excludes residential receptors. However, given the potential for future residential development, it seems likely that residents would be the most likely exposed receptors with regard to these ponds. Therefore, both residential and recreational receptors should be included in the assessment.

8. **Exposure Concentrations for Soil.** The exposure area over which soil data will be averaged in the human health risk assessment is being deferred until all data have been collected. While the Workplan is correct that spatial coverage of soil samples varies widely by Parcel (defined as the 10 areas described by TRC) and area of concern, a specific approach should be presented in the Workplan that adequately addresses the issues. This can be done prior to final data collection. The Workplan discusses several options, including averaging data over the size of a residential backyard (1000 square feet), which may include only a single boring, to averaging over an entire area of interest (e.g., Parcel 3). The Workplan further discuss differences in appropriate averaging areas for different receptors (e.g., residential, recreational, industrial). They state that the final approach will be discussed with the RWQCB and the Office of Environmental Health

Hazard Assessment (OEHHA), but this may exclude other parties from the decision-making process. Instead, we recommend the following approach:

- Use an upper 95 percent confidence limit of the mean for each spatially impacted area to evaluate future residential and construction worker exposures. This excludes non-detect locations, and serves as a reasonable yet conservative measure of potential future residential exposure to soils in each area. This may result in several datasets for residential exposure in each Parcel. Also, since a construction worker may be anywhere on the site, including hotspots, such an approach would also conservatively address this receptor. Conversely, if no chemicals are detected and included as COPCs in a given area, no calculations would be required.
- Use an upper 95 percent confidence limit of the mean for each Parcel for recreational receptors. This includes non-detect locations, and is appropriate for wide-ranging receptors such as recreators.
- Compile a facility-wide upper 95 percent confidence limit of the mean for each COPC and compare this value to the Parcel-specific values discussed in b above. Use the higher of the two for industrial receptors.

This approach negates the need for boring-specific evaluations, precludes the need for additional discussions with the agencies, and provides a transparent and conservative but not onerous approach for all human receptors.

9. **Homegrown Produce Equation (Table 6).** USEPA 2005c is a federal guidance document for the Resource Conservation and Recovery Act (RCRA) program, and may not be relevant for a RWQCB site. We recommend using exposure factors outlined in the CalEPA documents cited in Section 5.0 instead of RCRA ones for this source.

10. **Respirable Dusts (Appendix B).** Use of a 0.5 acre source is too small to be applicable to the mill site. The USEPA 1996 source lists Q/C values for larger sites; one or more of these should be used instead based on the size of the sources identified at the site. If all chemicals are quantitatively addressed, then area source-specific values can be developed for this factor.

11. **Leadspread Model (Table B.3-10).** Since home-grown produce is considered a complete pathway for the risk assessment, this pathway should be turned on in the spreadsheet, using the default value of 7%. This will lower the RBSCs for soil.

Ecological Risk Assessment Comments

Comments on the ecological risk assessment portion of the Workplan are subdivided into the following general categories:

- Receptors
- Toxicity Values and Ecological RBSCs
- Data Evaluation and COPC selection
- Exposure Scenarios and Pathways and Point Concentrations

1. **Ecological Receptors**. The burrowing owl is listed as having no appropriate habitat on the facility, and is not listed on Table 7. However, a burrow and owl have been reported to be present in the Parcel 4 area near Soldier Bay. Therefore, this special status species should be added as potentially present onsite. This species can be assumed to feed exclusively on small mammals from the site and therefore (pending onsite confirmation by a biologist) may represent a maximally exposed avian carnivore in the ERA.

2. **CSM for Ecological Receptors (Figure 6)**. Groundwater to surface water or sediments is not shown as a potential transport pathway for marine areas, only for ponds. This should be shown, even if identified as "likely incomplete". Airborne dust is not an incomplete pathway, and instead should be shown as a complete but insignificant pathway.

3. **Intertidal and Subtidal Marine Receptors**. These receptors are excluded from analysis because it is assumed that fresh surface waters from the log pond are substantially diluted upon entering the Bay. This assumption should be verified by comparing the surface water concentrations from the log pond with marine-based aquatic screening values (e.g., ambient water quality criteria; AWQC). If exceedances are noted, then further assessment (e.g., dilution modeling) of this medium and scenario may be warranted. In addition, TT states that "exposures…are considered potentially incomplete". This also means that they are potentially complete, and should be addressed. Either the pathway is incomplete, or it is considered to be potentially complete.

4. **Food Web for Emergent Wetland Habitat (Figure 8)**. The coyote should also be at the top of this food chain.

5. **Special Status Plant Species (Appendix D-1)**. How will exposure and potential toxicity be addressed for the 3 special status plant species present at the site (blasdale's bent grass, Indian paintbrush, and short leaved evax)?

6. **Vertebrate Species (Appendix D-2)**. It is not discussed in the text, but is the point of delineating between usage of freshwater emergent wetland and annual grassland to identify

different species that are appropriate for each habitat, or to limit indicator species to those that use both year-round? These types of details should be in the ecological risk assessment portion of the Workplan. For example, the great blue heron is one of the few bird species that use all three listed habitats year-round, and was also observed at the site. Nevertheless, the text clearly states that since rookeries are not present, the heron will not be identified as an indicator species. What other "carnivorous bird" (as shown on Figure 8) would be used instead for the emergent wetland habitat? A list of criteria for selecting indicator species, along with preliminary selections, should be in the Workplan. Appendix B lists only the deer mouse with regard to RBSCs for mammals, and none for birds. Carnivorous mammals and birds are dismissed as having large foraging areas. This is only appropriate if carnivorous mammals and birds are not more sensitive to COPCs than are deer mice. Also, it is unclear how the RBSCs will be applied to ecological receptors if they are only developed for one species.

7. **Soil and Sediment Depth Intervals for Ecological Receptors.** Although accurate based on likely exposure intervals to various receptors, delineating soil data into 0-2 (grasses, forbs, shrubs) and 0-5 foot (trees, wildlife) depth intervals may reduce the number of samples for each receptor to so few values that makes the could impact the value of such an approach. Also, if the upper two feet is most contaminated, use of the 0-5 foot interval for wildlife exposures would dilute exposure concentrations and potentially under-represent the exposures for wildlife receptors, particularly those that do not burrow, such as deer.

8. **Inhalation of VOCs by Burrowing Animals.** This pathway will be evaluated through "equilibrium partitioning between adsorbed, water, and soil gas phases". However, no details as to specific models or equations are presented. The appropriateness of this approach cannot be adequately evaluated. More detail should be provided, perhaps including an example of how this would be done using data from the TRC reports.

9. **Dermal Contact by Animals.** This pathway is excluded on the basis that "it is of limited consequence as most exposure for mammals is from soil and food ingestion". While this is true, substantial soil ingestion exposure can occur through grooming. This is typically included as a "soil ingestion" parameter, which is provided by TT. However, it should be stated that dermal exposure is subsumed by the ingestion pathway; it is not excluded from the assessment.

10. **Foraging Area for Wildlife.** Area-use factors are proposed for wide-ranging species, such as the red-tailed hawk and mule deer. This will be calculated as the total area of the site divided by the foraging area for the species. However, for the mule deer, it is likely that most of the foraging is conducted on the site due to the absence of appropriate foraging areas to the west (Ocean), south (Noyo Slough) and east (Highway 1). Therefore, for the mule deer an area-use factor of 1 should be used.

11. **Wildlife Exposure Factors (Table 9).** Based on this table, trees do not appear to be assumed exposed to soil. Considering that plant screening values are based on soil concentrations, how would groundwater concentrations be used to assess potential toxicity to trees? Also, the mallard's listed home range size of 111 hectares is much larger than Pond 8, but breeding mallards use this pond. Therefore, an area use factor of 1 should be used for this species. Footnote 5 indicates all food ingestion and water uptake rates were based on allometric equations from Nagy and USEPA's wildlife exposure factors handbook. The text states that some of these values were specific to target species, and allometric equations were used for other species. This should be clarified.

12. **Ecological Toxicity Values.** There are several issues associated with the proposed toxicological reference values (TRVs) for use in the ecological risk assessment. First, two TRVs are proposed for each chemical, one likely associated with impacts (TRV-high), and described in the Workplan as "in the middle of the range of possible adverse effects" and one at which no effects are expected (TRV-low). TT proposes to further evaluate chemicals in areas where concentrations exceed the TRV-low, but it is not clear if they will quantitatively evaluate a chemical unless it exceeds the TRV-high. For purposes of protecting ecological resources, TRV-high values are not appropriate since they are defined as levels associated with adverse effects. Although it is stated that the values are from regulatory-approved sources, many of the TRV-lows are compiled from a Navy/BTAG source, which may not be appropriate for a non-Department of Defense facility under CalEPA jurisdiction. As an example, TRVs recently developed (2005) by TT for the Aerojet Superfund site in Folsom, California were compared to those recommended for use at the mill site. Although all chemicals listed for both sites were reviewed, a few key chemicals are discussed here as examples to illustrate the issue. Rather than deal with species for which different allometric equations may have been used for each site, soil invertebrate TRVs were compared for purposes of this comment. Overall, almost all chemicals differed in the TRVs across the two sites, even though the endpoints were the same. The key chemicals discussed here include dioxins (i.e., 2,3,7,8-TCDD), PCBs, benzo(a)pyrene, and lead. In Appendix table E-2 for the mill site, TRVs for these four chemicals are listed as 5, 500, 360, and 500 mg/kg, respectively. At the Aerojet site, TRVs for these same chemicals are 500, 2510, 25000, and 100. All of these are at least 5-fold different, and some (e.g., dioxin) are 100-fold different. Not all values are lower at the mill site (e.g., lead), so a specific trend is not apparent. Instead, it demonstrates a high degree of uncertainty exists in development of TRVs, even when developed by the same company for the same endpoint for sites within northern California. These differences are more pronounced, and more difficult to explain, when TRVs for the deer mouse are compared for the two sites. For example, the ecological RBSC for arsenic at Aerojet is listed as 0.25 mg/kg, which is below the TRV-low for the mill site of 10 mg/kg. Similarly, the RBSC for barium at Aerojet of 112 mg/kg is also below the lowest TRV listed in Table B-1.8 of 339 mg/kg. This underscores the concern regarding the validity and application of the ecological RBSCs presented in the Workplan. TRVs should be indicator-species specific, and a clear

hierarchy of methods presented that outlines exactly how the TRVs will be developed. Once all data have been received, data for each chemical should then be compared to species-specific TRVs. Instead, we strongly urge Georgia-Pacific to use the benchmarks developed by ORNL for the different types of guilds identified at the site. This would include the deer mouse, rabbit, deer, fox, robin (or swallow), and hawk, which is a much more comprehensive, and appropriate, list of indicator species with which to screen site data for ecological risk assessment at this site (see Comment 13 below).

13. **Ecological RBSCs (Table B-3.11).** Use of the deer mouse leads to higher numbers than if the deer were used in this table (see ORNL Ecotoxicological Benchmarks). Therefore, we do not agree with the mammalian-based TRVs. Further, none of these are relevant for avian species. For example, the ORNL value for beryllium for a deer mouse is 1.32 milligrams per kilogram (mg/kg) in soil. The value for the deer is 0.19 mg/kg, which is seven-fold lower. A benzene concentration of 20 mg/kg would be below the screening value based solely on the deer mouse, which would lead to excluding benzene from quantitative evaluation. However, consideration of the deer would lead to the opposite, and more health protective, conclusion. The TRV-low and TRV-high for beryllium listed in the table for the deer mouse are 134 and 670 mg/kg, respectively, which are much higher than the value for this metal in the ORNL sources. Sources of the TRVs provided by TT are listed in Appendix E, but full references are not provided. It appears that several of these sources were for other sites at which the same chemicals were evaluated; it is not clear if these are relevant to this site.

14. **Interspecies Scaling of Toxicity Values.** It is not clear why the Sample and Arenal (1999) values are proposed for extrapolating toxicity data across species in the absence of a chemical-specific scaling factor rather than the values from USEPA's Wildlife Exposure Factors Handbook (which is cited as a source for other parts of the ERA), or the values directly from ORNL.

15. **Application of Ecological RBSCs (Appendix B).** It is not appropriate to eliminate metals in soil that are below the 75th quartile concentrations from Bradford et al. from comparison with RBSCs. As discussed in the general comments, site-specific background concentrations will be established for the site. These are the concentrations to which site soil data should be compared, not Bradford et al. data. Secondly, since only a single species is being used in the RBSC comparison, all chemicals exceeding the TRV-lows should be quantitatively addressed in the ERA. Because bioaccumulation is not factored into this step (i.e., no carnivores or upper-tier species are considered in the screening), doses may be much higher for these upper-trophic level species, and could exceed TRVs where those based on the deer mouse may not.

Although the Workplan is generally well written and conforms with CalEPA guidance documents, many specific items do not appear appropriate for this site. In some cases, exposure pathways or receptors were eliminated without appropriate justification, and the approach to RBSCs and COPC identification appears flawed. Substantial modification to the ecological risk assessment portion of the Workplan is necessary to expand on the somewhat cursory preliminary problem formulation step before we can agree with the approach. We hope this letter provides useful suggestions for improving and clarifying the proposed approach. Feel free to discuss these comments with Dr. Stelljes directly at 925-229-1411.

Sincerely,

Mark E. Stelljes, Ph.D.
Director of Risk Assessment and Toxicology
SLR International Corp

Mr. Glenn Young
Project Manager
Fugro West, Inc.

Cc: Dr. Kay Johnson, Tetra Tech (Lafayette)
Dr. Theodore Donn, Tetra Tech (Lafayette)
Dr. Craig Hunt, RWQCB (Santa Rosa)
Mr. Michael Acton, AME (El Dorado Hills)
Dr. Jim Carlisle, OEHHA (Sacramento)
Ms. Linda Ruffing, Executive Director (Fort Bragg Redevelopment Agency)
Mr. Michael Gogna (Fort Bragg Redevelopment Agency Counsel)